

SEQUENCE LISTING

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Koetting, Oliver

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Steup, Martin

<120> Methods for identifying proteins with starch phosphorylating enzymatic activity

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<140> Unassigned
<141> 2006-09-01

<150> PCT/EP2005/002454

<151> 2005-03-04

<150> EP04090483.1

<151> 2004-12-15

<150> EP04090121.7

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<150> EP04090087.0

<151> 2004-03-05

<150> US60/549,980 provisional

<151> 2004-03-05

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<170> PatentIn version 3.1

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Gln Val Cys Leu Glu His Gln Val Lys Phe Gly Glu His Val Gly Ile
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Ile Gly Ser Thr Lys Glu Leu Gly Ser Trp Glu Glu Gln Val Glu Leu
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gaa tgg act aca aat ggt tgg gtc tgc cag ctt aag ctc cct gga gaa      387
Glu Trp Thr Thr Asn Gly Trp Val Cys Gln Leu Lys Leu Pro Gly Glu
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Thr Leu Val Glu Phe Lys Phe Val Ile Phe Leu Val Gly Gly Lys Asp
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aaa ata tgg gaa gat ggt aat aac cgt gtt gtt gag ctg ccg aag gat      483
Lys Ile Trp Glu Asp Gly Asn Asn Arg Val Val Glu Leu Pro Lys Asp
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ggt aag ttt gat ata gta tgc cac tgg aat aga aca gaa gag cca tta      531
Gly Lys Phe Asp Ile Val Cys His Trp Asn Arg Thr Glu Glu Pro Leu
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Glu Leu Leu Gly Thr Pro Lys Phe Glu Leu Val Gly Glu Ala Glu Lys
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cgc Arg	ggg Gly	ata Ile	ttg Leu 285
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gaa Glu	atc Ile 395	aag Lys	cat His
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aaa Lys	ctt Leu	cat His	cgt Arg 405
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cct Pro	gga Gly	gaa Glu	tac Tyr
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agc Ser	gaa Glu	cta Leu	aaa Lys
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Lys Arg Arg Asp Ser Ser Lys Gln Pro Leu Val His Leu Gln Val Cys
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Gly Thr Pro Lys Phe Glu Leu Val Gly Glu Ala Glu Lys Asn Thr Gly

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Ile Gln Ile Leu Met Thr Thr Leu Gln Ser Leu Ser Ser Leu Arg Ser
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Phe Gln Val Ser Lys Leu Cys Thr Val Leu Gln Lys Ala Ile Arg Glu
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690

695

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Val Leu Gly Ser Thr Gly Trp Asp Val Leu Val Pro Gly Val Ala His
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Gln Glu Leu Pro His Leu Ser His Leu Gly Val Arg Ala Arg Gln Glu
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Val Asn Leu Ser Ile Val Ser Glu Lys Asn Asp Asn Ala Val Ser Thr
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Ser Met Glu Asp Ala Leu Lys Lys Ser Gly Ser Leu Glu Ser Phe Thr
930 935 940

Ser Leu Leu Glu Lys Ile Glu Thr Ala Lys Val Glu Asn Gly Glu Val
Page 20

945		950		955		960
Asp Ser Leu Ala	Leu Glu Leu Gln Ala	Ile Ile Ser His Leu Ser Pro				
	965	970			975	
Pro Glu Glu Thr	Ile Ile Phe Leu Lys Arg Ile Phe Pro Gln Asp Val					
	980	985			990	
Arg Leu Ile Val Arg Ser Ser Ala	Asn Val Glu Asp Leu Ala Gly Met					
	995	1000			1005	
Ser Ala Ala Gly Leu Tyr Asp	Ser Ile Pro Asn Val Ser Leu Met					
	1010	1015			1020	
Asp Pro Cys Ala Phe Gly Ala	Ala Val Gly Lys Val Trp Ala Ser					
	1025	1030			1035	
Leu Tyr Thr Arg Arg Ala	Ile Leu Ser Arg Arg Ala Ala Gly Val					
	1040	1045			1050	
Tyr Gln Arg Asp Ala Thr	Met Ala Val Leu Val Gln Glu Ile Leu					
	1055	1060			1065	
Gln Pro Asp Leu Ser Phe	Val Leu His Thr Val Cys Pro Ala Asp					
	1070	1075			1080	
His Asp Pro Lys Val Val	Gln Ala Glu Val Ala Pro Gly Leu Gly					
	1085	1090			1095	
Glu Thr Leu Ala Ser Gly	Thr Arg Gly Thr Pro Trp Arg Leu Ser					
	1100	1105			1110	
Cys Asn Lys Phe Asp Gly	Lys Val Ala Thr Leu Ala Phe Ser Asn					
	1115	1120			1125	
Phe Ser Glu Glu Met Val	Val His Asn Ser Gly Pro Ala Asn Gly					
	1130	1135			1140	
Glu Val Ile Arg Leu Thr	Val Asp Tyr Ser Lys Lys Pro Leu Ser					
	1145	1150			1155	
Val Asp Thr Thr Phe Arg	Lys Gln Phe Gly Gln Arg Leu Ala Ala					
	1160	1165			1170	
Ile Gly Gln Tyr Leu Glu	Gln Lys Phe Gly Ser Ala Gln Asp Val					
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Glu Gly Cys Leu Val Gly Lys	Asp Ile Phe Ile Val Gln Ser Arg					

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1195

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Pro Gln Pro
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Val Glu Ala Glu Val Ala Pro
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Phe Gly Ser Ala Val Ala Arg Val Trp Ala Ser Leu Tyr Thr Arg Arg
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gcc atc ctc agc cgc cgg gtg gct ggc gtg ccc cag agg gac gcc aag 143
Ala Ile Leu Ser Arg Arg Val Ala Gly Val Pro Gln Arg Asp Ala Lys
35 40 45

atg gct gtc ctg gtg cag gag atg ctg gag cca gag cta tcc ttc gtg 191
Met Ala Val Leu Val Gln Glu Met Leu Glu Pro Glu Leu Ser Phe Val
50 55 60

ctc cac acg gtc agc ccc tcg gac cac gac acc agg gtc gtc gag gct 239
Leu His Thr Val Ser Pro Ser Asp His Asp Thr Arg Val Val Glu Ala
65 70 75

gag gtt gcc ccg ggg ctg ggc gag acc ctt gcc gct ggc acc cgc ggc 287
Glu Val Ala Pro Gly Leu Gly Glu Thr Leu Ala Ala Gly Thr Arg Gly
80 85 90 95

acc ccg tgg cgt ctc tcc tgc gac aag ttc gac acc gac gtc gcc acc 335
Thr Pro Trp Arg Leu Ser Cys Asp Lys Phe Asp Thr Asp Val Ala Thr
100 105 110

ctg gcc ttc gcc aac ttc agt gag gag atg cgg gtg ctc ggc tcg ggc 383
Leu Ala Phe Ala Asn Phe Ser Glu Glu Met Arg Val Leu Gly Ser Gly
115 120 125

ccc gcc gac ggc gag gtg gtg agg ctc act gtc gac tac agc acg aag 431
Pro Ala Asp Gly Glu Val Val Arg Leu Thr Val Asp Tyr Ser Thr Lys
130 135 140

ctg ctc tcc gtc gac agg acc ttc agg cag aag ttc ggt cag cgg ctg	479
Leu Leu Ser Val Asp Arg Thr Phe Arg Gln Lys Phe Gly Gln Arg Leu	
145 150 155	
gcc gcc gtg ggg cag tac ctg gag cag agg ttc ggg agc gcc cag gac	527
Ala Ala Val Gly Gln Tyr Leu Glu Gln Arg Phe Gly Ser Ala Gln Asp	
160 165 170 175	
gtg gag ggc tgc atg gtc tgg gaa gac atc tac ata gtg cag agc atg	575
Val Glu Gly Cys Met Val Trp Glu Asp Ile Tyr Ile Val Gln Ser Met	
180 185 190	
cca caa ccg ctg tag agtcatccgt aataatgttt agatgagcaa agttttggtt	630
Pro Gln Pro Leu 195	
ggtgaaataa aatttgccga aaatcccatg gcaaaataag tcagggtatga agagccccgcc	690
tgcgaaacca actgattcta aataatgttt tgaattcgtg tttaaattat gggacgtgaa	750
caatgatttc cttggaatgc atgcattgta agttttaaaa aaaaaaaaaa aaaaaaa	807

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Ile Leu Ser Arg Arg Val Ala Gly Val Pro Gln Arg Asp Ala Lys Met
35 40 45
Ala Val Leu Val Gln Glu Met Leu Glu Pro Glu Leu Ser Phe Val Leu
50 55 60
His Thr Val Ser Pro Ser Asp His Asp Thr Arg Val Val Glu Ala Glu
65 70 75 80
Val Ala Pro Gly Leu Gly Glu Thr Leu Ala Ala Gly Thr Arg Gly Thr
85 90 95
Pro Trp Arg Leu Ser Cys Asp Lys Phe Asp Thr Asp Val Ala Thr Leu
100 105 110
Ala Phe Ala Asn Phe Ser Glu Glu Met Arg Val Leu Gly Ser Gly Pro

115 120 125
 Ala Asp Gly Glu Val Val Arg Leu Thr Val Asp Tyr Ser Thr Lys Leu
 130 135 140
 Leu Ser Val Asp Arg Thr Phe Arg Gln Lys Phe Gly Gln Arg Leu Ala
 145 150 155 160
 Ala Val Gly Gln Tyr Leu Glu Gln Arg Phe Gly Ser Ala Gln Asp Val
 165 170 175
 Glu Gly Cys Met Val Trp Glu Asp Ile Tyr Ile Val Gln Ser Met Pro
 180 185 190
 Gln Pro Leu
 195

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Pro Glu Glu Cys Lys Ala Val Gly Asn
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Thr Glu Glu Tyr Ser Glu Thr
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Arg Phe Val Asn Ala Val Glu
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<212> DNA

<213> Solanum tuberosum

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ggg ctt gaa gac tat gca ttt gtt ctt ttg agc agg ttt gtg aat gca 96
Gly Leu Glu Asp Tyr Ala Phe Val Leu Leu Ser Arg Phe Val Asn Ala
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gtt gaa gct cta ggc gga gct gat tgg ctt gca gag aat gta aca gtg 144
Val Glu Ala Leu Gly Gly Ala Asp Trp Leu Ala Glu Asn Val Thr Val
35 40 45

aaa aac att agt tct tgg aat gat cca att gga gca ctt aca gtt gga 192
Lys Asn Ile Ser Ser Trp Asn Asp Pro Ile Gly Ala Leu Thr Val Gly
50 55 60

atc caa cag cta ggt ata tct ggt tgg aag ccc gag gaa tgc aaa gct 240
Ile Gln Gln Leu Gly Ile Ser Gly Trp Lys Pro Glu Glu Cys Lys Ala
65 70 75 80

gtt gga aat gaa ctt ttg tca tgg aaa gaa agg ggt att tca gaa att 288
 Val Gly Asn Glu Leu Leu Ser Trp Lys Glu Arg Gly Ile Ser Glu Ile
 85 90 95

gaa ggc agc gaa gat ggt aag act ata tgg gca tta aga cta aaa gcg 336
 Glu Gly Ser Glu Asp Gly Lys Thr Ile Trp Ala Leu Arg Leu Lys Ala
 100 105 110

act ctt gat aga agt cga agg tta act gag gag tat tcc gag aca ctt 384
 Thr Leu Asp Arg Ser Arg Arg Leu Thr Glu Glu Tyr Ser Glu Thr Leu
 115 120 125

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 Leu Gln Ile Phe Pro Glu
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Val Glu Ala Leu Gly Gly Ala Asp Trp Leu Ala Glu Asn Val Thr Val
 35 40 45

Lys Asn Ile Ser Ser Trp Asn Asp Pro Ile Gly Ala Leu Thr Val Gly
 50 55 60

Ile Gln Gln Leu Gly Ile Ser Gly Trp Lys Pro Glu Glu Cys Lys Ala
 65 70 75 80

Val Gly Asn Glu Leu Leu Ser Trp Lys Glu Arg Gly Ile Ser Glu Ile
 85 90 95

Glu Gly Ser Glu Asp Gly Lys Thr Ile Trp Ala Leu Arg Leu Lys Ala
 100 105 110

Thr Leu Asp Arg Ser Arg Arg Leu Thr Glu Glu Tyr Ser Glu Thr Leu
 115 120 125

Leu Gln Ile Phe Pro Glu
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<400> 17

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Asp Ala Pro Asp Ser Ala Ile Ala
1 5

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<213> Sorghum bicolor

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Ile Pro Glu Asn Ser Val Arg Thr Tyr
1 5

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tat	tct	gca	ata	tat	cta	aag	tgg	ata	tat	act	ggt	caa	ata	cca	tgc	97
Tyr	Ser	Ala	Ile	Tyr	Leu	Lys	Trp	Ile	Tyr	Thr	Gly	Gln	Ile	Pro	Cys	
			20					25					30			

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Phe	Glu	Asp	Gly	Gly	His	His	Arg	Pro	Asn	Lys	His	Ala	Glu	Ile	Ser	
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agg	caa	att	ttt	cgt	gaa	att	gaa	agg	ata	tac	tat	ggg	gaa	aac	aca	193
Arg	Gln	Ile	Phe	Arg	Glu	Ile	Glu	Arg	Ile	Tyr	Tyr	Gly	Glu	Asn	Thr	
	50					55					60					

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Ser	Ala	Gln	Asp	Leu	Leu	Val	Ile	Arg	Lys	Ile	His	Pro	Cys	Leu	Pro	
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tca	ttt	aaa	tca	gaa	ttt	act	gcc	tct	gtt	cct	cta	aca	cga	att	cgt	289
Ser	Phe	Lys	Ser	Glu	Phe	Thr	Ala	Ser	Val	Pro	Leu	Thr	Arg	Ile	Arg	
				85					90					95		

gat	att	gct	cat	cgt	aat	gac	ata	cca	cat	gat	ctc	aag	caa	gaa	atc	337
Asp	Ile	Ala	His	Arg	Asn	Asp	Ile	Pro	His	Asp	Leu	Lys	Gln	Glu	Ile	
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Lys	His	Thr	Ile	Gln	Asn	Lys	Leu	His	Arg	Asn	Ala	Gly	Pro	Glu	Asp	
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ctt	att	gct	act	gaa	gcc	atg	ctt	gct	agg	att	act	aag	act	cct	gga	433
Leu	Ile	Ala	Thr	Glu	Ala	Met	Leu	Ala	Arg	Ile	Thr	Lys	Thr	Pro	Gly	
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tta	aaa	gat	ttc	ttc	aat	gct	ggc	agc	cta	ctg	gag	caa	gtg	caa	tcc	529
Leu	Lys	Asp	Phe	Phe	Asn	Ala	Gly	Ser	Leu	Leu	Glu	Gln	Val	Gln	Ser	

165								170						175						
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ctg Leu	aaa Lys	acc Thr 195	aaa Lys	aag Lys	aat Asn	tta Leu	gac Asp 200	caa Gln	ctg Leu	gaa Glu	gat Asp	gca Ala 205	aaa Lys	gat Asp	ttg Leu	625				
gat Asp	gaa Glu 210	aat Asn	ggt Gly	ggc Gly	gtt Val	caa Gln 215	gtt Val	ttg Leu	ttg Leu	aaa Lys	gcc Ala 220	ttg Leu	ctg Leu	tcg Ser	tta Leu	673				
tct Ser 225	tat Tyr	cta Leu	aga Arg	tca Ser	att Ile 230	cta Leu	atg Met	aag Lys	ggt Gly	ctg Leu 235	gaa Glu	agt Ser	ggc Gly	ctt Leu	aga Arg 240	721				
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tgt Cys	gag Glu	atc Ile	ggg Gly 260	ctt Leu	gaa Glu	gat Asp	tat Tyr	tcg Ser 265	ttt Phe	gta Val	ttg Leu	tta Leu	agt Ser 270	aga Arg	tac Tyr	817				
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gca Ala	ctt Leu 370	ctt Leu	tct Ser	ata Ile	ttt Phe	cct Pro 375	gaa Glu	aaa Lys	gtc Val	aag Lys	gtt Val 380	ctt Leu	ggg Gly	aaa Lys	gcc Ala	1153				
ctt Leu 385	gga Gly	ata Ile	cca Pro	gag Glu	aac Asn 390	agt Ser	gtg Val	aga Arg	aca Thr	tac Tyr 395	act Thr	gaa Glu	gct Ala	gaa Glu	att Ile 400	1201				
cgt Arg	gct Ala	ggt Gly	gtt Val	att Ile 405	ttt Phe	cac His	gtc Val	tcg Ser	aaa Lys 410	ctt Leu	tgc Cys	act Thr	gta Val	ctt Leu 415	tta Leu	1249				
aaa Lys	gca Ala	act Thr	cga Arg	gca Ala	gtt Val	ctt Leu	gga Gly	tcg Ser	tct Ser	gtg Val	tgg Trp	gat Asp	gtt Val	ctt Leu	gtt Val	1297				

420										425										430										
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Pro	Gly	Val	Ala	His	Gly	Ala	Leu	Ile	Gln	Val	Glu	Arg	Ile	Ala	Pro															
		435					440					445																		
gga	tca	ttg	cca	tca	tcc	atc	aaa	gaa	cct	gtc	gtg	cta	ggt	gta	aac	1393														
Gly	Ser	Leu	Pro	Ser	Ser	Ile	Lys	Glu	Pro	Val	Val	Leu	Val	Val	Asn															
	450					455					460																			
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Lys	Ala	Asp	Gly	Asp	Glu	Glu	Val	Lys	Ala	Ala	Gly	Asp	Asn	Ile	Val															
465					470					475					480															
ggt	gtt	att	ctt	cta	caa	gaa	tta	cct	cac	cta	tca	cat	ctt	ggt	gtt	1489														
Gly	Val	Ile	Leu	Leu	Gln	Glu	Leu	Pro	His	Leu	Ser	His	Leu	Gly	Val															
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Tyr	Ser	Ala	Ile	Tyr	Leu	Lys	Trp	Ile	Tyr	Thr	Gly	Gln	Ile	Pro	Cys
			20					25					30		

Phe	Glu	Asp	Gly	Gly	His	His	Arg	Pro	Asn	Lys	His	Ala	Glu	Ile	Ser
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Arg	Gln	Ile	Phe	Arg	Glu	Ile	Glu	Arg	Ile	Tyr	Tyr	Gly	Glu	Asn	Thr
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Ser	Ala	Gln	Asp	Leu	Leu	Val	Ile	Arg	Lys	Ile	His	Pro	Cys	Leu	Pro
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Ser	Phe	Lys	Ser	Glu	Phe	Thr	Ala	Ser	Val	Pro	Leu	Thr	Arg	Ile	Arg
				85					90					95	

Asp	Ile	Ala	His	Arg	Asn	Asp	Ile	Pro	His	Asp	Leu	Lys	Gln	Glu	Ile
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Lys	His	Thr	Ile	Gln	Asn	Lys	Leu	His	Arg	Asn	Ala	Gly	Pro	Glu	Asp
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115

120

125

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Glu Tyr Ser Glu Ala Phe Val Glu Gln Phe Lys Thr Phe Tyr Ser Glu
 145 150 155 160

Leu Lys Asp Phe Phe Asn Ala Gly Ser Leu Leu Glu Gln Val Gln Ser
 165 170 175

Ile Glu Gln Ser Leu Asp Glu Ser Gly Leu Glu Ala Leu Ser Ser Phe
 180 185 190

Leu Lys Thr Lys Lys Asn Leu Asp Gln Leu Glu Asp Ala Lys Asp Leu
 195 200 205

Asp Glu Asn Gly Gly Val Gln Val Leu Leu Lys Ala Leu Leu Ser Leu
 210 215 220

Ser Tyr Leu Arg Ser Ile Leu Met Lys Gly Leu Glu Ser Gly Leu Arg
 225 230 235 240

Asn Asp Ala Pro Asp Ser Ala Ile Ala Met Arg Gln Lys Trp Arg Leu
 245 250 255

Cys Glu Ile Gly Leu Glu Asp Tyr Ser Phe Val Leu Leu Ser Arg Tyr
 260 265 270

Ile Asn Ala Leu Glu Ala Leu Gly Gly Ser Ala Ser Leu Ala Glu Gly
 275 280 285

Leu Pro Thr Asn Thr Ser Leu Trp Asp Asp Ala Leu Asp Ala Leu Val
 290 295 300

Ile Gly Ile Asn Gln Val Ser Phe Ser Gly Trp Lys Pro Asn Glu Cys
 305 310 315 320

Thr Ala Ile Val Asn Glu Leu Leu Ser Trp Lys Gln Lys Gly Leu Ser
 325 330 335

Glu Phe Glu Gly Ser Glu Asp Gly Lys Tyr Ile Trp Ala Leu Arg Leu
 340 345 350

Lys Ala Thr Leu Asp Arg Ser Arg Arg Leu Thr Glu Glu Tyr Ser Glu
 355 360 365

Ala Leu Leu Ser Ile Phe Pro Glu Lys Val Lys Val Leu Gly Lys Ala
 Page 32

370

375

380

Leu Gly Ile Pro Glu Asn Ser Val Arg Thr Tyr Thr Glu Ala Glu Ile
 385 390 395 400

Arg Ala Gly Val Ile Phe His Val Ser Lys Leu Cys Thr Val Leu Leu
 405 410 415

Lys Ala Thr Arg Ala Val Leu Gly Ser Ser Val Trp Asp Val Leu Val
 420 425 430

Pro Gly Val Ala His Gly Ala Leu Ile Gln Val Glu Arg Ile Ala Pro
 435 440 445

Gly Ser Leu Pro Ser Ser Ile Lys Glu Pro Val Val Leu Val Val Asn
 450 455 460

Lys Ala Asp Gly Asp Glu Glu Val Lys Ala Ala Gly Asp Asn Ile Val
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Gly Val Ile Leu Leu Gln Glu Leu Pro His Leu Ser His Leu Gly Val
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Arg Ala Arg Gln Glu Lys Val Val Phe Val Thr Cys
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<213> Triticum aestivum

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<211> 509

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gaa tct ttg aat gat tct ggc tta gaa gca ctg tca tca ttt gtc aaa	144
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Thr Lys Gln Ser Leu Asp Gln Val Asp Ala Ala Asn Ile Gln Val Val	
50 55 60	

atg aag acc ttg cag tca ttg tct tca ttg aga tca gtt cta atg aag	240
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Gly Leu Glu Ser Gly Leu Arg Asn Asp Ala Thr Asp Ala Gly Ile Ala	
85 90 95	

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100 105 110	

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Phe Val Leu Leu Ser Arg Tyr Ile Asn Gly Leu Glu Ala Ser Gly Gly	
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Glu Ser Leu Asn Asp Ser Gly Leu Glu Ala Leu Ser Ser Phe Val Lys
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Thr Lys Gln Ser Leu Asp Gln Val Asp Ala Ala Asn Ile Gln Val Val
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Met Lys Thr Leu Gln Ser Leu Ser Ser Leu Arg Ser Val Leu Met Lys
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Gly Leu Glu Ser Gly Leu Arg Asn Asp Ala Thr Asp Ala Gly Ile Ala
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Met Arg Gln Lys Trp Arg Leu Cys Glu Ile Gly Leu Glu Asp Tyr Ser
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Phe Val Leu Leu Ser Arg Tyr Ile Asn Gly Leu Glu Ala Ser Gly Gly
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